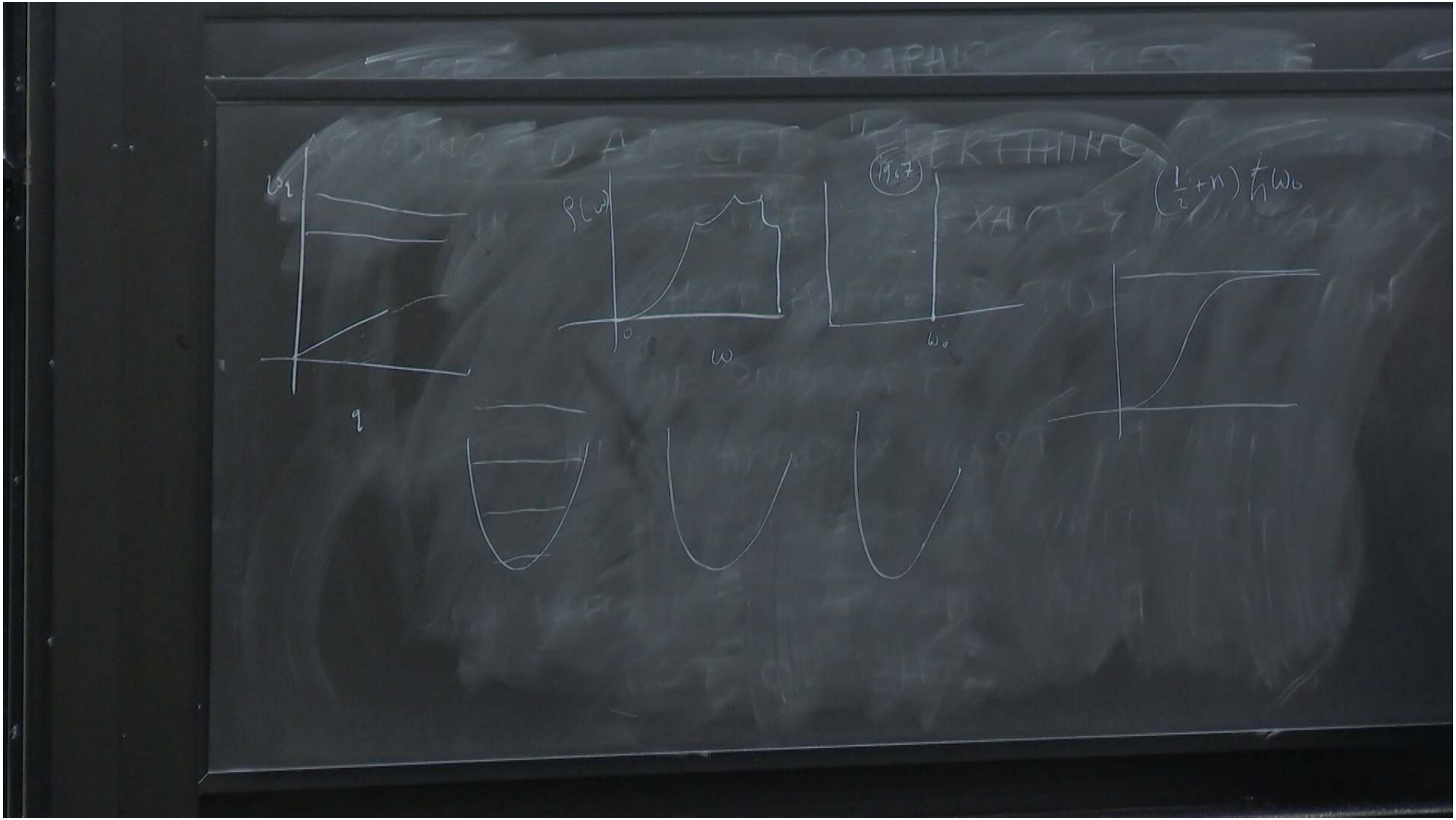
Title: Quantum Matter Lecture (230405)

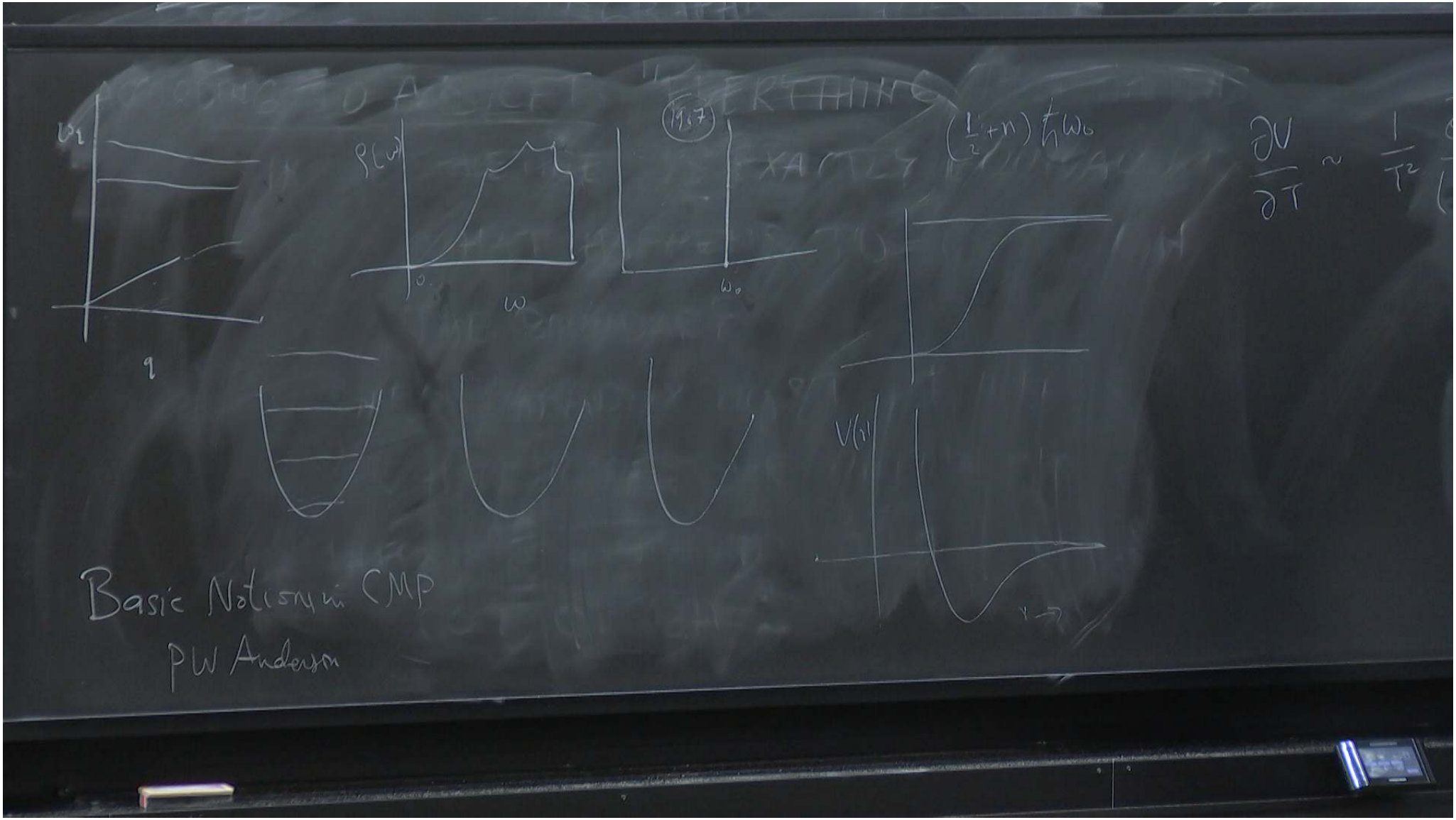
Speakers: Ganapathy Baskaran

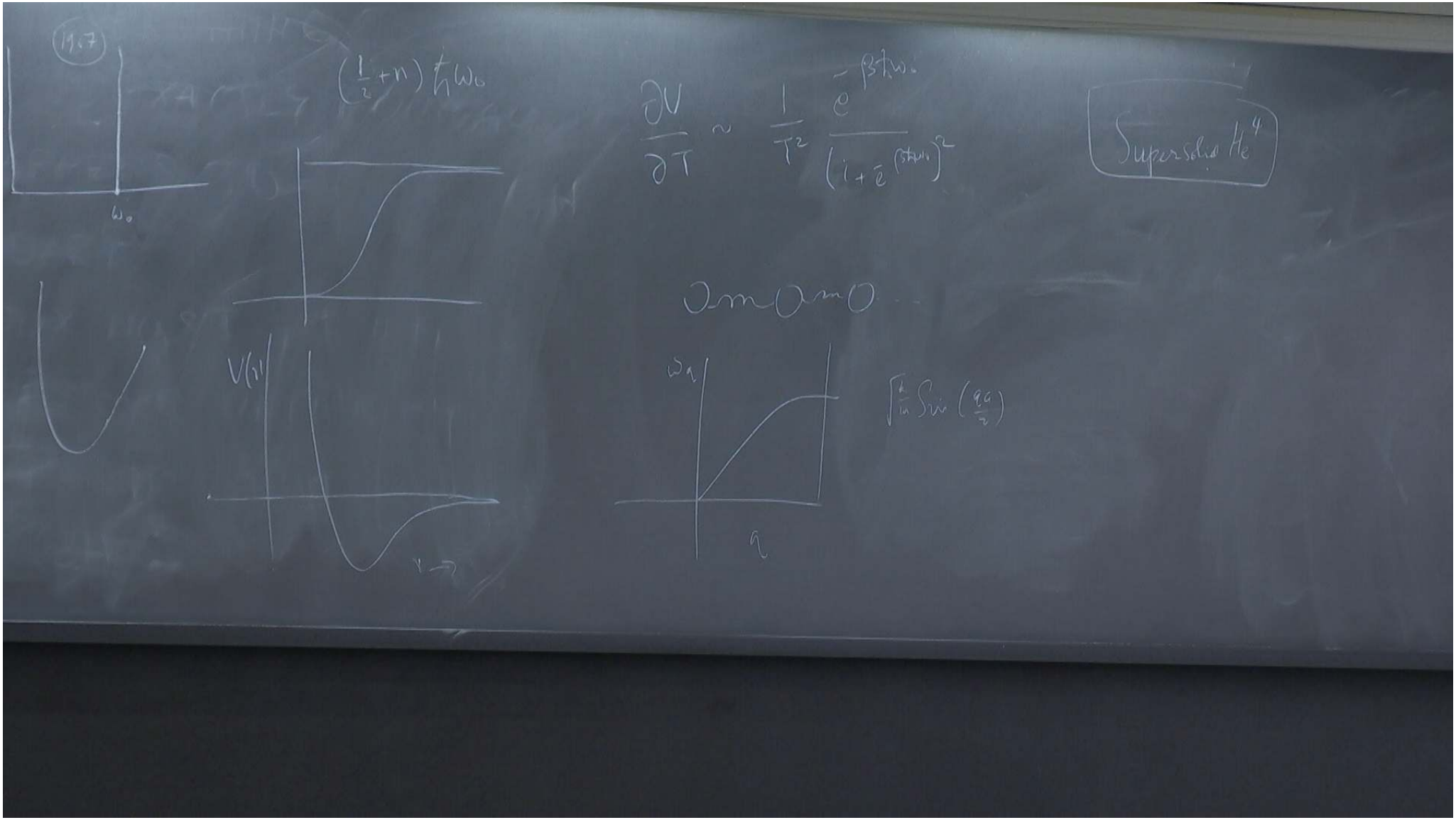
Collection: Quantum Matter (2022/2023)

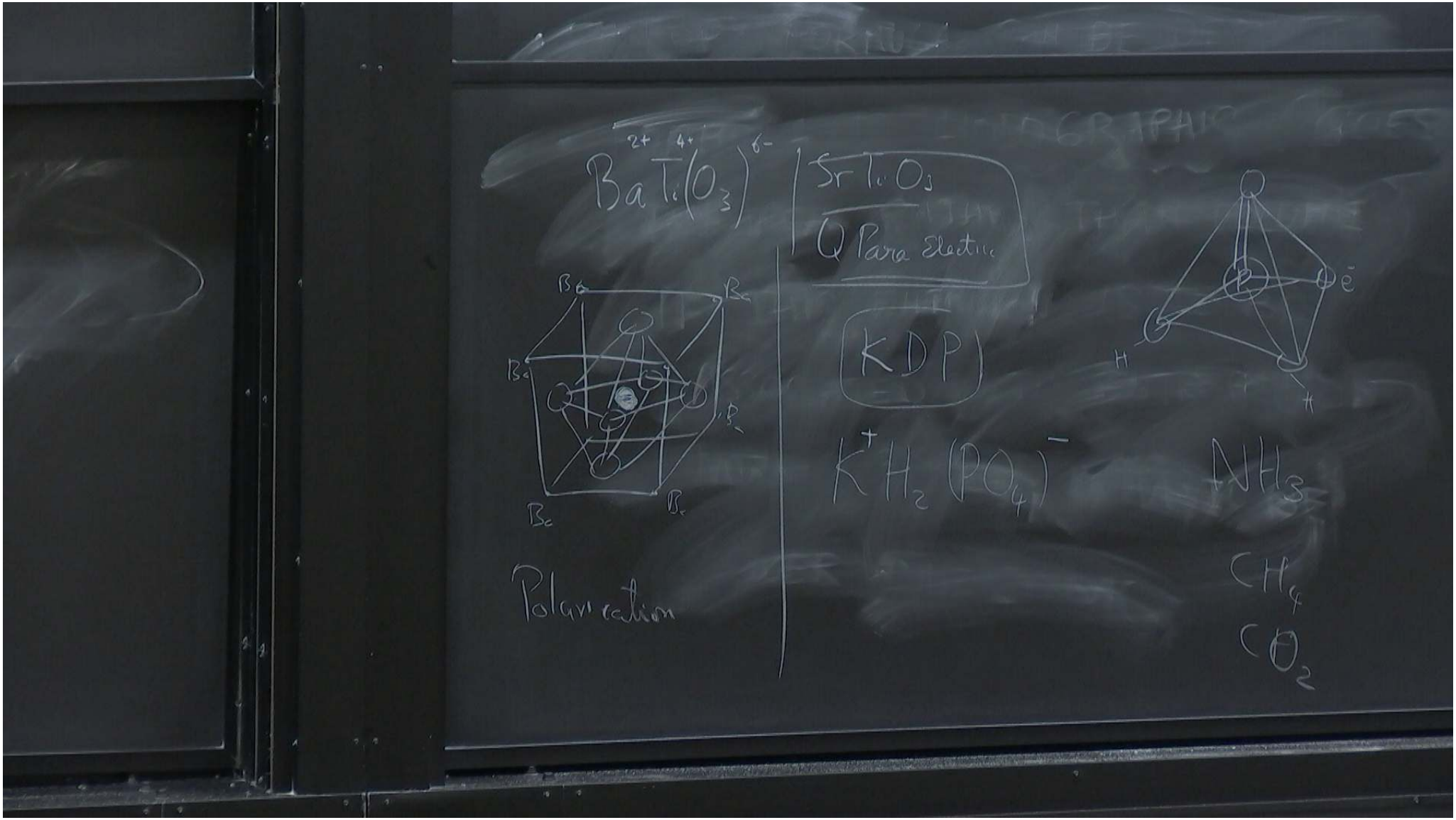
Date: April 05, 2023 - 10:15 AM

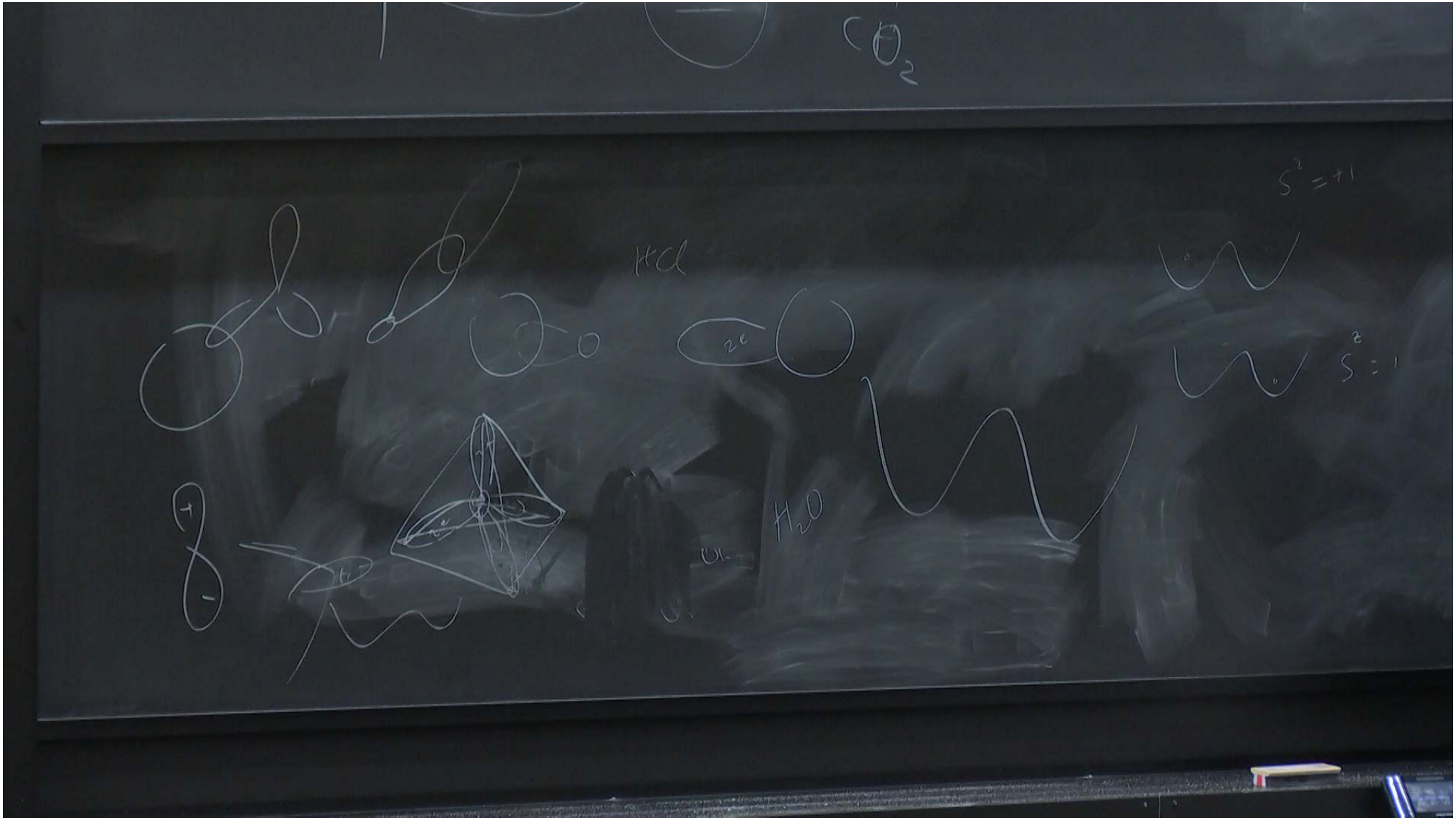
URL: https://pirsa.org/23040007

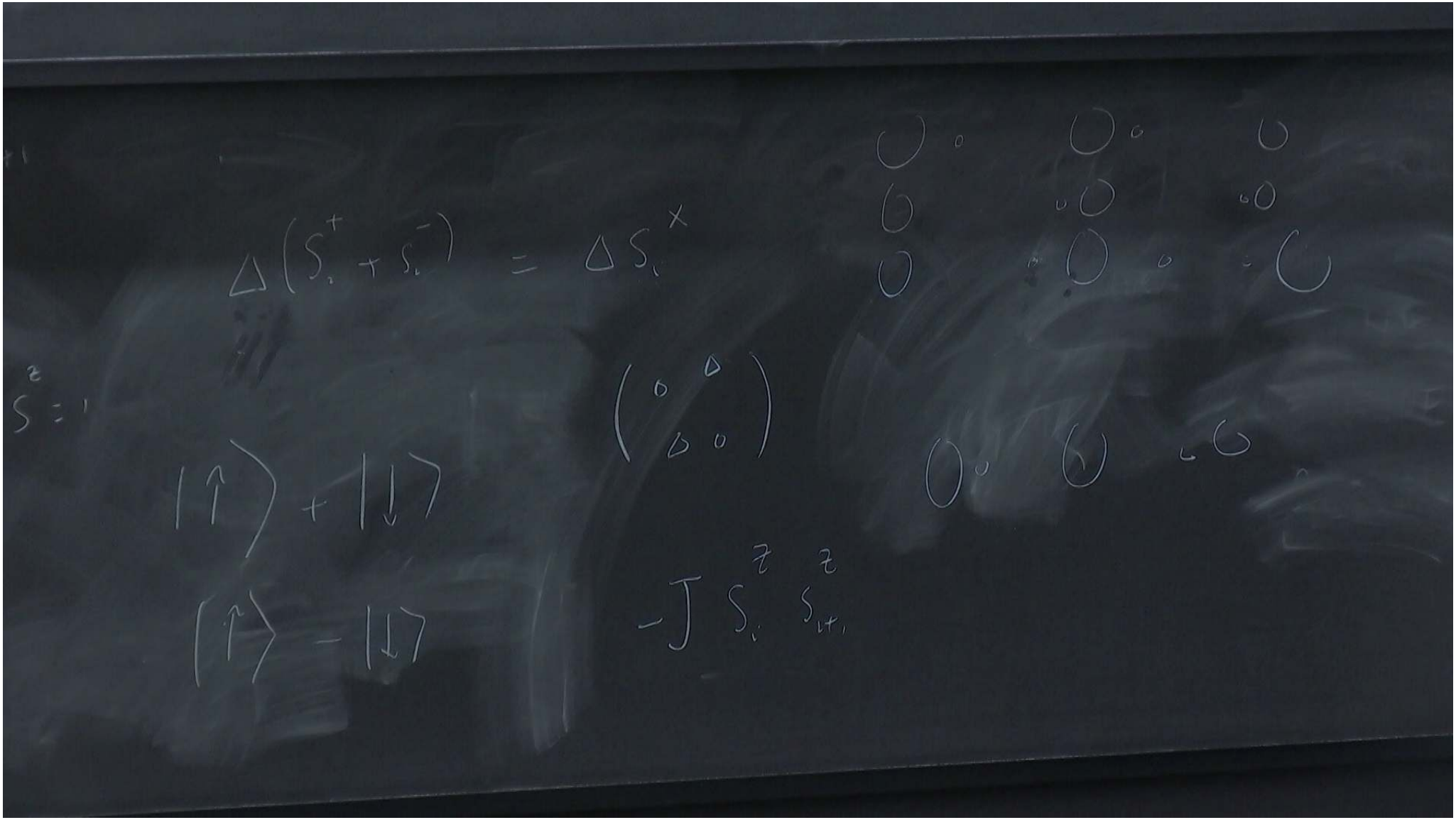

ρ(ω)
ω
(19.7)
$(\frac{1}{2}+n)\hbar\omega_0$
q

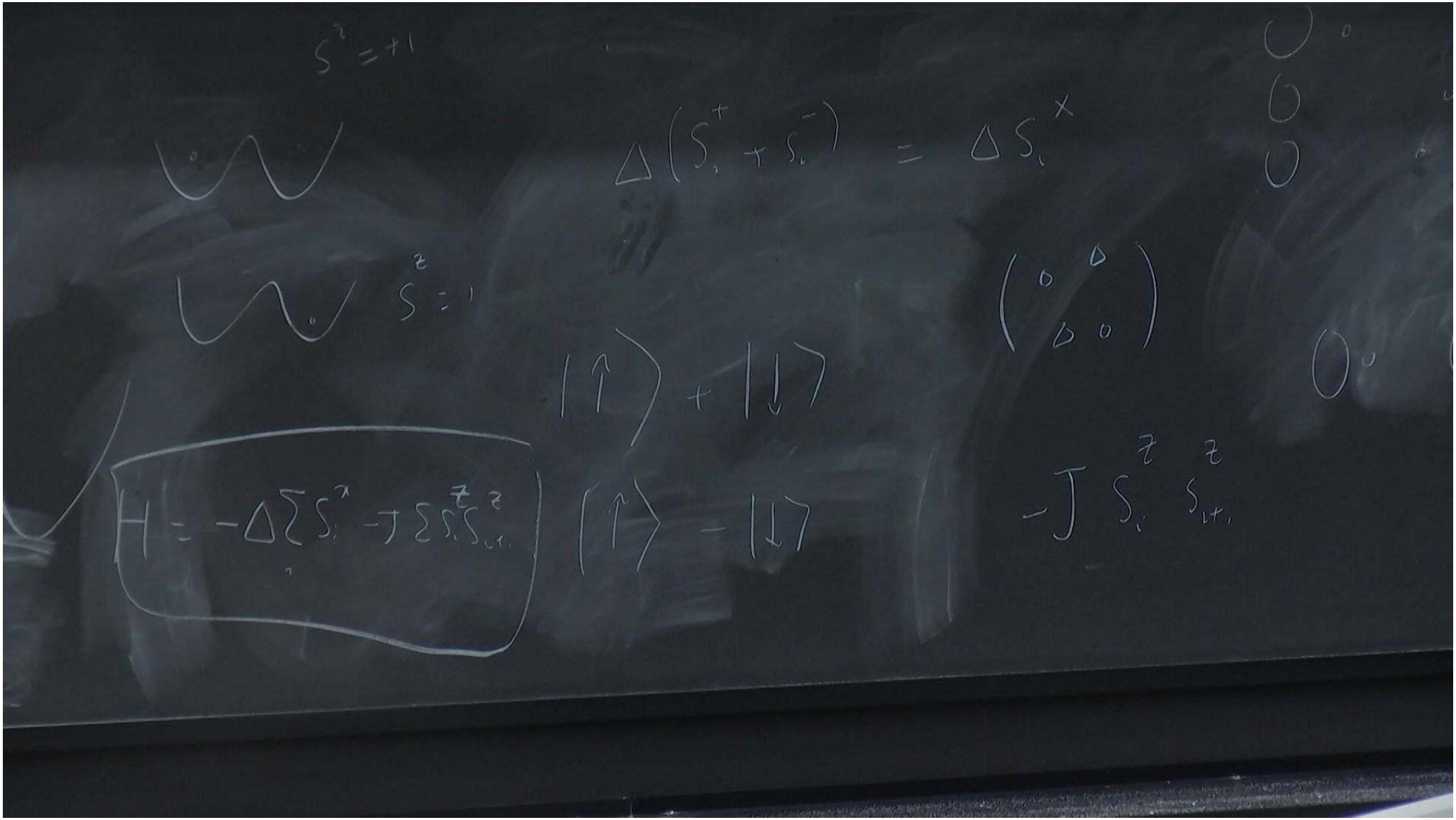

Basic Notions in CMP
PW Anderson

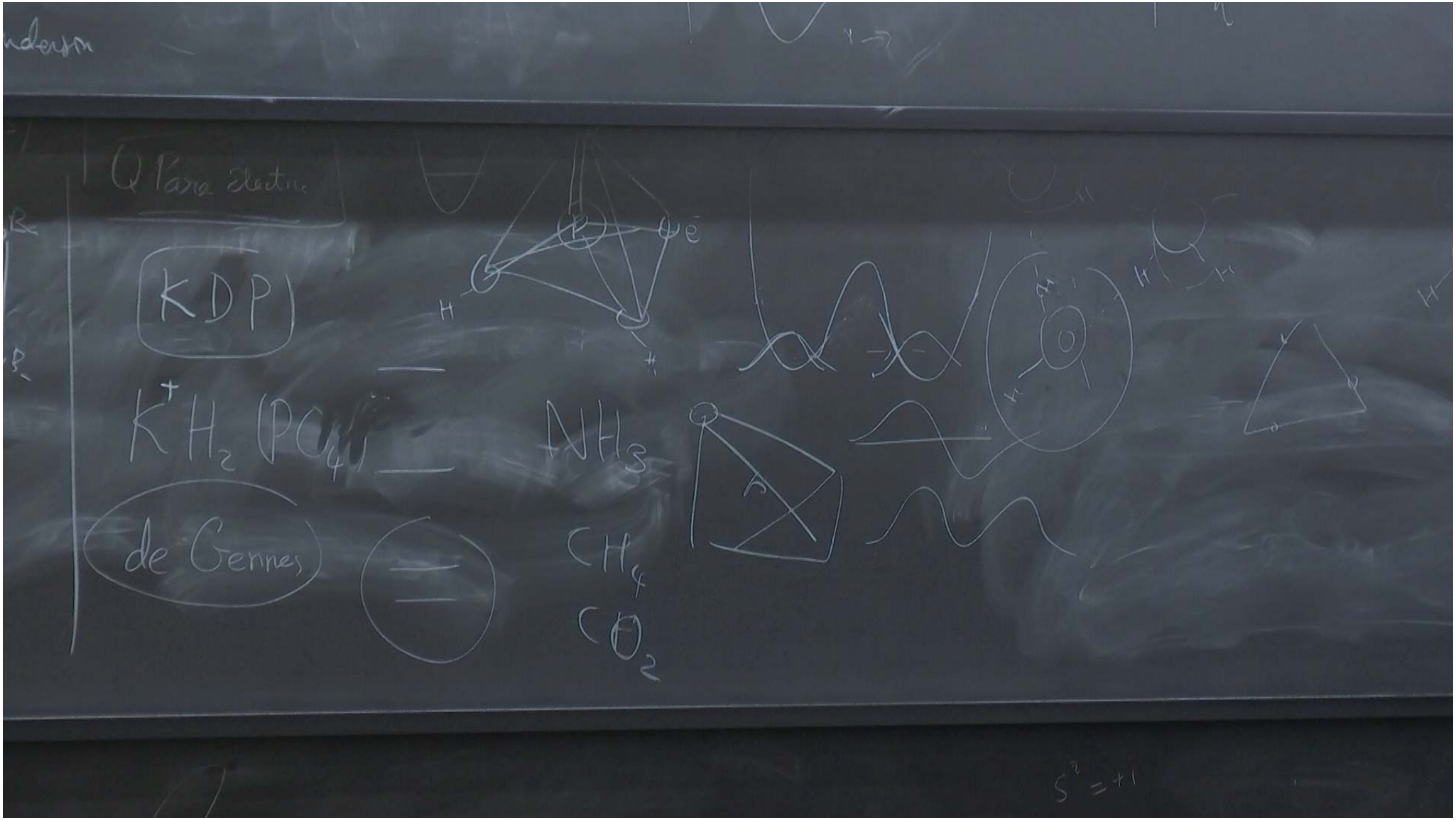

(1.7)
$(\frac{1}{2}+n)\hbar\omega_0$
ω_0
$\frac{\partial V}{\partial T} \sim \frac{1}{T^2} \frac{e^{-\beta\hbar\omega_0}}{(1+e^{-\beta\hbar\omega_0})^2}$
Supersolid He^4
V(r)
r
ω_q
q
$\sqrt{\frac{2}{Na}} \sin(\frac{qa}{2})$

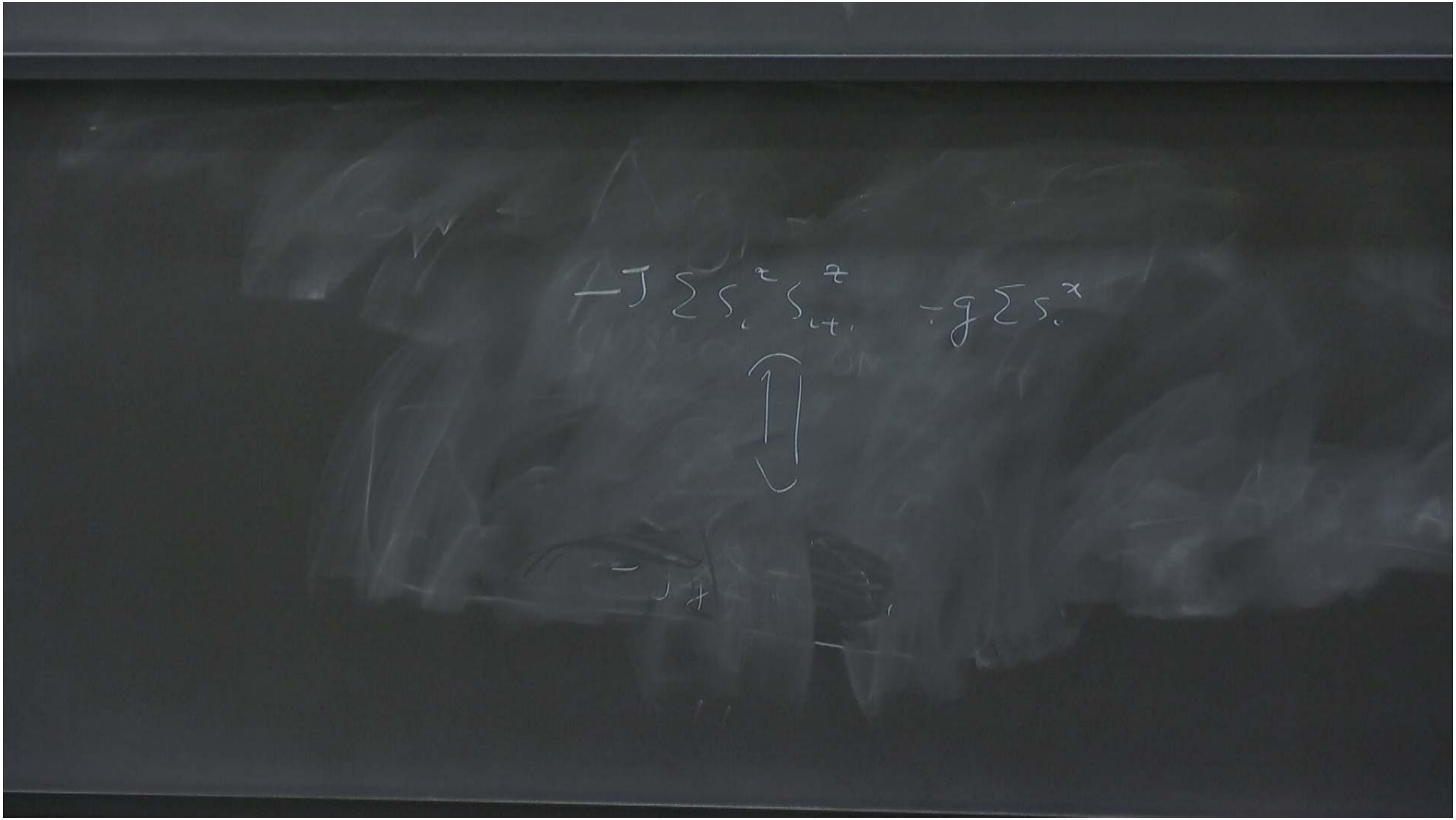

$BaTi(O_3)$
$SrTiO_3$
Q Para Electric
KDP
KH_2PO_4
NH_3
CH_4
CO_2
Polarization

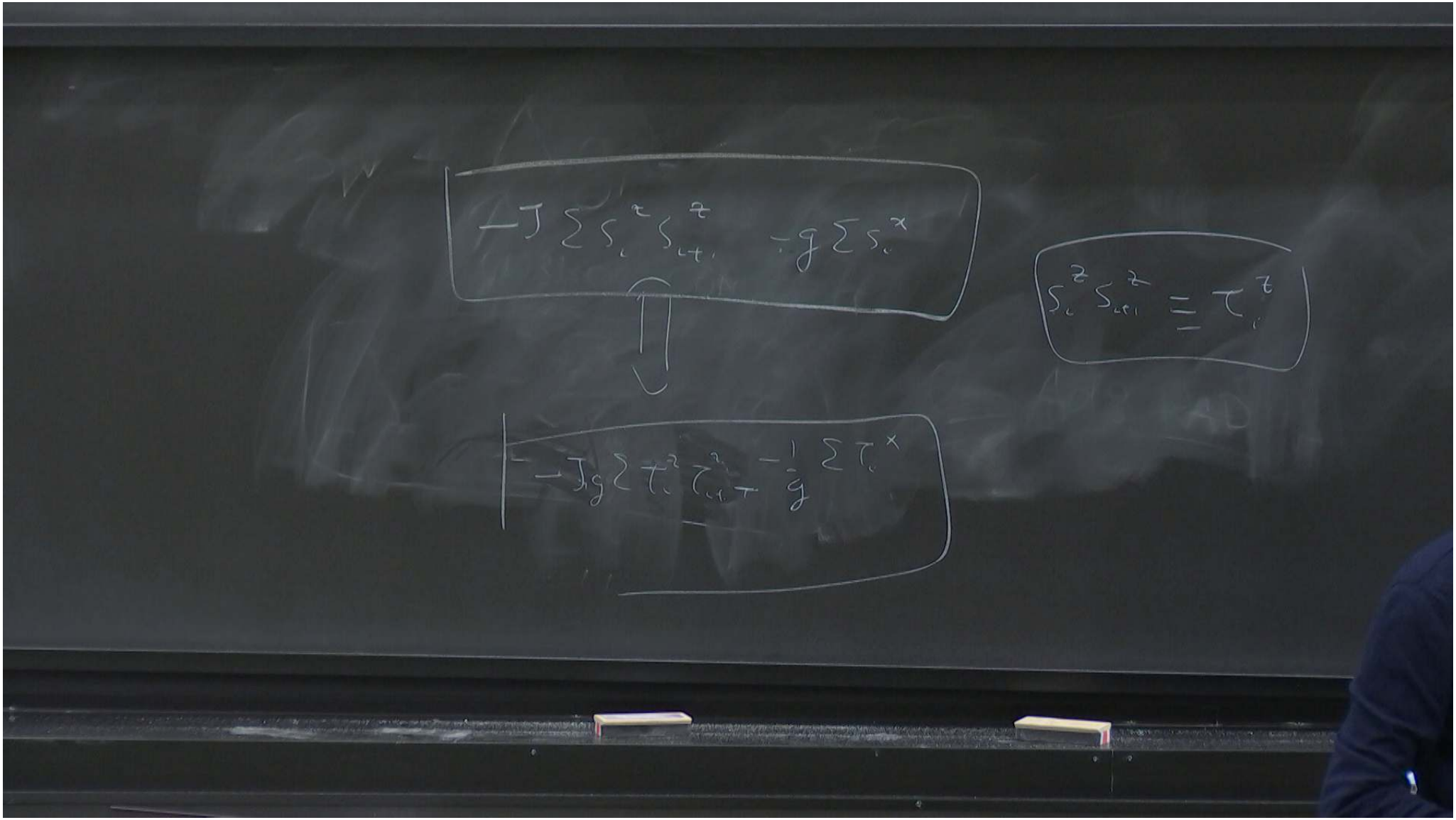

CO_2
HCl
H_2O
$S^2 = +1$
$S^2 = -1$

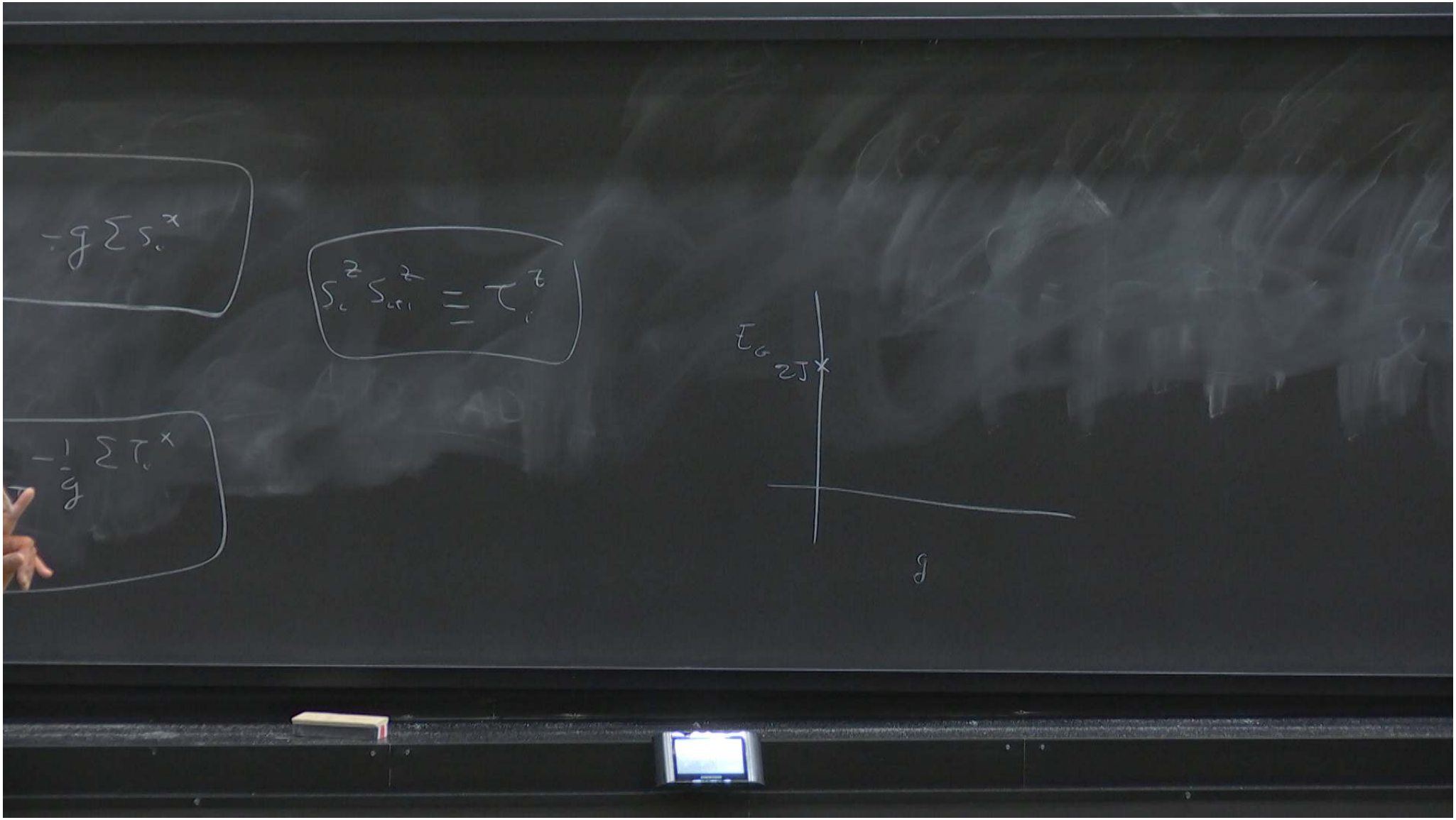

$\Delta(S_i^+ + S_i^-) = \Delta S_i^x$
$S^z = 1$
$|\uparrow\rangle + |\downarrow\rangle$
$|\uparrow\rangle - |\downarrow\rangle$
$-J S_i^z S_{i+1}^z$

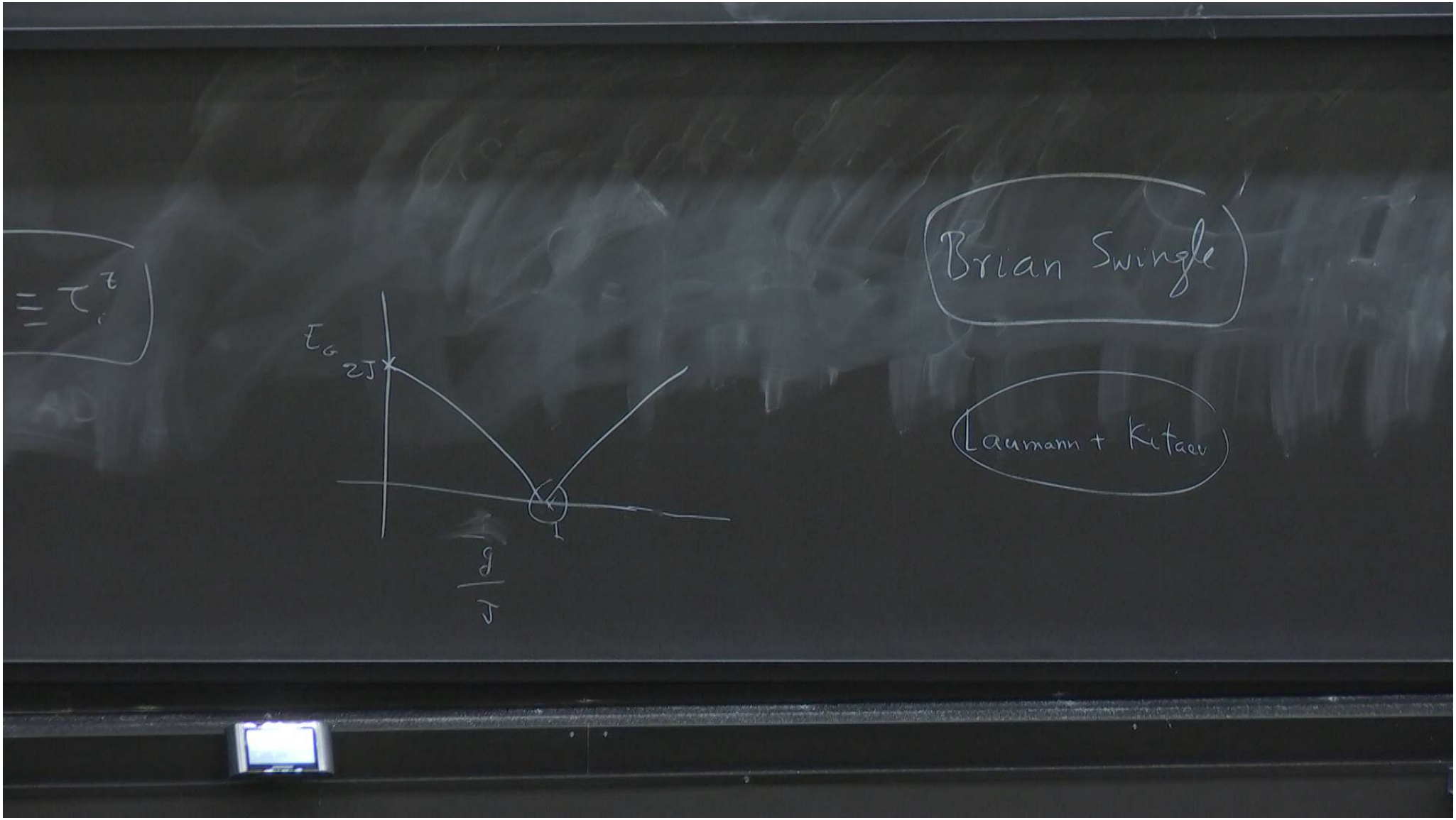

$S^z = \pm 1$
$\Delta(S_i^+ + S_i^-) = \Delta S_i^x$
$S^z = 1$
$|\uparrow\rangle + |\downarrow\rangle$
$H = -\Delta \sum S_i^x - J \sum S_i^z S_{i+1}^z$
$|\uparrow\rangle - |\downarrow\rangle$
$-J S_i^z S_{i+1}^z$


KDP
$K^+H_2PO_4^-$
NH_3
CH_4
CO_2
de Gennes
$S^2 = +1$


$-J\sum S_i^z S_{i+1}^z - g\sum S_i^x$


$-J\sum S_i^z S_{i+1}^z - g\sum S_i^x$
$S_i^z S_{i+1}^z = \tau_i^z$
$-J_1 g \sum \tau_i^z \tau_{i+1}^z - \frac{1}{g}\sum \tau_i^x$


$-g\sum_i \sigma_i^x$
$\sigma_i^z \sigma_{i+1}^z = \tau_i^z$
$-\frac{1}{g}\sum_i \tau_i^x$
τ_G
$2J$
g


Brian Swingle
Laumann + Kitaev
2J
g/J